SmartSwitch 9000
9C214-2 DC Power Supply
Installation Guide

9031305-05

CABLETRON SYSTEMS

The Complete Networking Solution™

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Application of Council Directive(s):	**89/336/EEC** **73/23/EEC**
Manufacturer's Name:	**Cabletron Systems, Inc.**
Manufacturer's Address:	**35 Industrial Way** **PO Box 5005** **Rochester, NH 03867**
European Representative Name:	**Mr. J. Solari**
European Representative Address:	**Cabletron Systems Limited** **Nexus House, Newbury Business Park** **London Road, Newbury** **Berkshire RG13 2PZ, England**
Conformance to Directive(s)/Product Standards:	**EC Directive 89/336/EEC** **EC Directive 73/23/EEC** **EN 55022** **EN 50082-1** **EN 60950**
Equipment Type/Environment:	**Networking Equipment, for use in a** Commercial or Light **Industrial Environment.**

We the undersigned, hereby declare, under our sole responsibility, that the equipment packaged with this notice conforms to the above directives.

Manufacturer	Legal Representative in Europe
Mr. Ronald Fotino	Mr. J. Solari
Full Name	Full Name
Principal Compliance Engineer	Managing Director - E.M.E.A.
Title	Title
Rochester, NH, USA	Newbury, Berkshire, England
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Chapter 1

Introduction

Using This Manual

Read through this manual to become familiar with its contents and gain an understanding of the features and capabilities of the 9C214-2 Power Supply prior to installation and operation.

Chapter 1, **Introduction**, provides a brief description of the 9C214-2 Power Supply and its features. This chapter also includes a list of related manuals and information on getting help.

Chapter 2, **Installing the 9C214-2 Power Supply**, contains detailed steps for unpacking, installing, and powering up the 9C214-2 Power Supply.

Chapter 3, **9C214-2 Power Supply Operation**, contains detailed information regarding the power supply operation.

Chapter 4, **Specifications**, provides detailed specifications of the 9C214-2 Power Supply.

The 9C214-2 Power Supply

The 9C214-2 Power Supply, shown in Figure 1-1, is a 1000 watt, triple output supply that accepts positive or negative 36–72 volt DC input. It provides power to the three power busses within the SmartSwitch 9000 chassis. At least one power supply must be installed; however, additional power supplies can be installed to achieve redundancy. When two or more power supplies are properly installed, the power supplies use a current sharing scheme where under all load conditions each supply provides power equally.

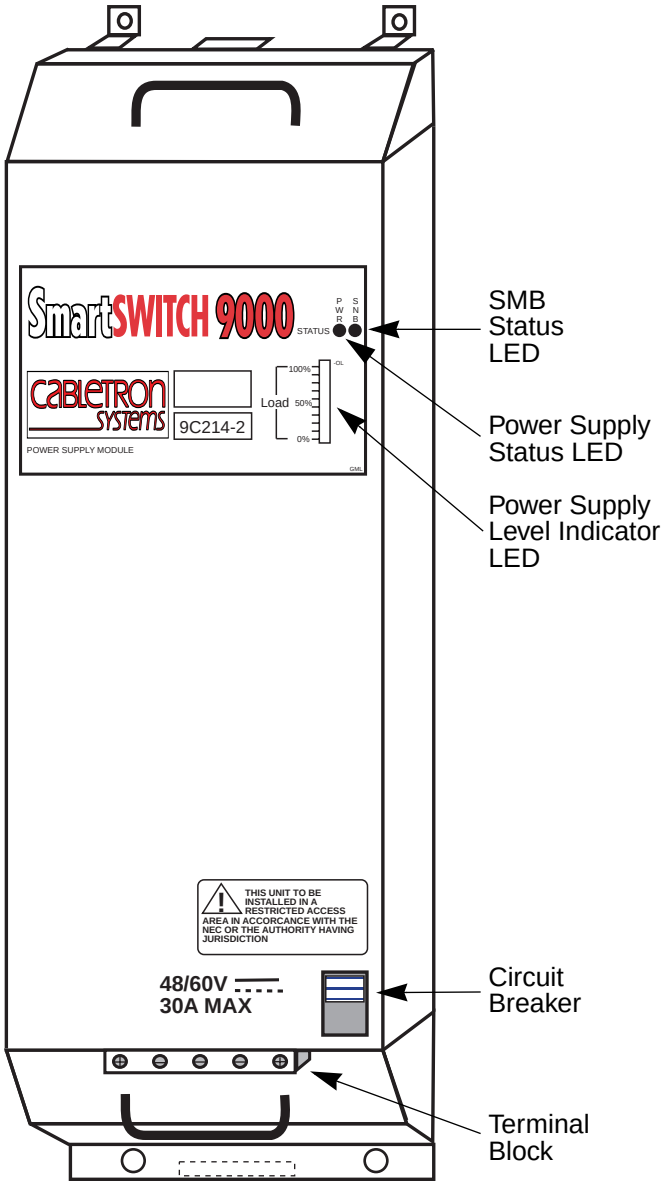


Figure 1-1. The 9C214-2 Power Supply

Features

Diagnostic Controller for Management

Each 9C214-2 Power Supply has a diagnostic controller. This diagnostic controller includes a microprocessor that monitors the numerous power supply functions available to the Network Manager via the LCD on the 9C300-1 Environmental Module, as well as local and remote management functions.

Internal Temperature Sensor

Each 9C214-2 Power Supply has its own built-in temperature sensor for monitoring and reporting its own internal temperature to the Network Manager via LCD, as well as local and remote management.

Cooling Fan

Each 9C214-2 Power Supply has its own cooling fan. The microprocessor within the diagnostic controller increases or decreases the fan speed based on the temperature of the power supply. In the event of microprocessor failure, fan speed defaults to 100% to ensure protection of the power supply.

Thermal Overload Protection

Each 9C214-2 Power Supply includes a thermal shutdown circuit. This circuit protects the power supply from overheating by shutting the power supply down if a thermal overload occurs. Automatic recovery takes place after the thermal overload condition is corrected.

Load Sharing

Each 9C214-2 Power Supply uses a current sharing design. This design allows multiple power supplies to equally (within ± 5%) share the output load. For example, if two power supplies are used, each power supply provides 50% ± 5% of the output load. This feature increases the life of each power supply.

Input Polarity Detection

The 9C214-2 Power Supply is equipped with an input polarity detection feature. In the event that input to the terminal block is reversed, a buzzer within the power supply sounds.

Hot Swapping

A 9C214-2 Power Supply can be installed or removed from the back of the chassis while another power supply is operating without affecting network operation. However, before removing a power supply make sure the switch is turned off.

LANVIEW® LEDs

Each 9C214-2 Power Supply has three LANVIEW LEDS: the PWR Status LED indicates the status of the 9C214-2 input and all outputs, the SMB Status LED indicates the status of the diagnostic controller, and the Power Supply Level Indicator LED indicates the percentage of the power supply's capacity being used.

Power Distribution System

The SmartSwitch 9000 uses a distributed DC power system (Figure 1-2) similar to those used in super computers. Three separate power buses are used to distribute DC power. The 48 volt DC System Power Bus, located on the backplane, powers all modules and the system cooling fans. The Diagnostic Power Bus provides 5 volts DC to all of the system's diagnostic controllers and the environmental module. The INB termination power bus provides 3.3 volts DC to the SmartSwitch 9000 9C614 INB termination modules.

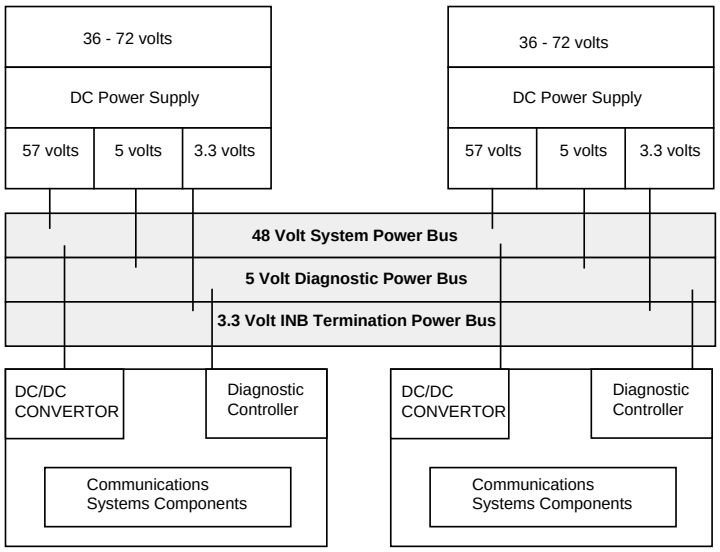


Figure 1-2. Distributed DC Power Distribution System

Related Manuals

The manuals listed below should be used to supplement the procedures and technical data contained in this manual.

SmartSwitch 9000 Installation Guide

SmartSwitch 9000 Operations Guide

SmartSwitch 9000 9C300-1 Environmental Module User's Guide

In addition, each Interface Module has a user's guide.

Getting Help

For additional support related to this device or document, contact the Cabletron Systems Global Call Center:

Phone	(603) 332-9400
Internet mail	support@ctron.com
FTP Login Password	ctron.com (134.141.197.25) *anonymous* *your email address*
BBS Modem setting	(603) 335-3358 8N1: 8 data bits, No parity, 1 stop bit
For additional information about Cabletron Systems or its products, visit the World Wide Web site: **http://www.cabletron.com/** For technical support, select **Service and Support**.	
To send comments or suggestions concerning this document, contact the Cabletron Systems Technical Writing Department via the following email address: **TechWriting@ctron.com** *Make sure to include the document Part Number in the email message.*	

Before calling the Cabletron Systems Global Call Center, have the following information ready:

- Your Cabletron Systems service contract number
- A description of the failure
- A description of any action(s) already taken to resolve the problem (e.g., changing mode switches, rebooting the unit, etc.)
- The serial and revision numbers of all involved Cabletron Systems products in the network
- A description of your network environment (layout, cable type, etc.)
- Network load and frame size at the time of trouble (if known)
- The device history (i.e., have you returned the device before, is this a recurring problem, etc.)
- Any previous Return Material Authorization (RMA) numbers

Chapter 2

Installing the 9C214-2 Power Supply

This unit to be installed in a restricted access area in accordance with the NEC or the authority having jurisdiction. When installing the unit the following guidelines must be met:

- *Connect to a 48Vdc SELV source which is reliably connected to earth ground.*
- *The branch circuit over current protection must be rated max 30A.*
- *Use #10AWG copper conductors only.*
- *A readily accessible disconnect device that is suitably approved and rated shall be incorporated in the field wiring.*

At least one power supply must be installed on the rear of the SmartSwitch 9000 chassis. Additional power supplies can be added to achieve redundancy.

The first power supply is installed on the right side of the chassis (looking from the back of the chassis to the front) by plugging it into the power supply connector on the back of the SmartSwitch 9000 chassis as shown in Figure 2-1.

Install the first power supply by following the steps below:

1. Unpack the power supply by removing it from the shipping box and sliding the two foam end caps off the unit. (Save the shipping box and packing materials in the event the power supply must be reshipped.)

2. Remove the power supply from the protective plastic bag. (Save the bag in the event the power supply must be reshipped.)

3. Examine the power supply carefully, checking for damage. If any damage exists, DO NOT install the power supply. Immediately contact Cabletron Systems Technical Support.

4. Loosen and remove the two screws from one of the power supply connector covers on the rear of the SmartSwitch 9000 chassis.

5. Remove the cover. (Keep the cover in the event you need to remove the power supply. The cover must be replaced to protect the connector.)

6. Hold the power supply by the handles on the top and bottom of the unit, and do the following:

   a. Align the power supply so that the lip on the bottom and the hook on the top are slightly above the corresponding slots on the chassis.

   b. Ease the power supply down until the hook catches the slot on the top and the tab is inserted in the slot on the bottom.

   c. Plug the power supply into the connector on the back of the chassis by pushing the power supply until its frame touches the surface of the SmartSwitch 9000 chassis. Do not force the power supply in place. If significant resistance is encountered before the frame is flush with the chassis, remove the power supply, realign it, and push it in again.

   d. Secure the power supply to the chassis by tightening the two screws on the top and two screws on the bottom of the power supply. For proper chassis grounding, the four screws must be properly tightened.

7. If you are installing a second power supply, repeat steps 1–6.

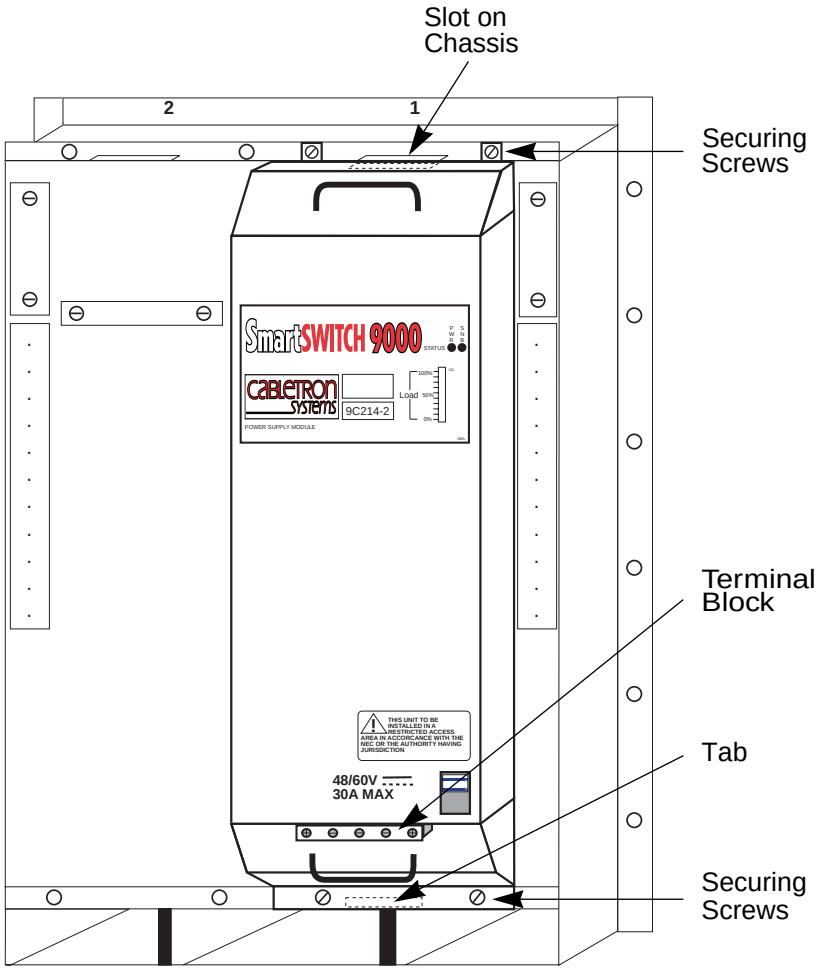


Figure 2-1. Installing the 9C214-2 Power Supply

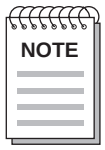
Connecting Power Source

A nominal 48 or 60 volt positive or negative power source can be connected to a 9C214-2 Power Supply. Follow the appropriate steps starting below to make the proper connection.

Connecting a Nominal 48/60 Volt Positive Power Source

The nominal 48/60 volt positive power source is connected to a 9C214-2 Power Supply using at least number 10AWG (5 square millimeters) copper wire to which ring or spade terminals that will accept a number ten screw have been attached. Connect the power source to the connections on the terminal block on the 9C214-2 Power Supply (Figure 2-2) by following the steps below.

1. Interrupt power at the nominal 48/60 volt power source.
2. Turn off the power supply circuit breaker.
3. Remove the cover protecting the terminal block.
4. Connect the earth ground lead to the earth ground terminal.
5. Connect the 48/60 volt return lead to the negative terminal.
6. Connect the 48/60 volt lead to the positive terminal.
7. Replace the cover on the terminal block.
8. Restore power to the 48/60 volt power source.
9. Turn on the power supply circuit breaker.



If the input polarity detection buzzer sounds after turning on the power supply circuit breaker, the connections are wrong. Turn off the power supply circuit breaker, interrupt power at the nominal 48/60 volt power source, disconnect the power source and make the necessary changes to the existing connections.

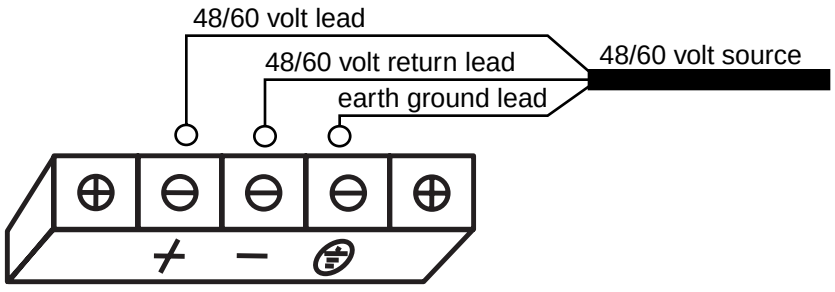
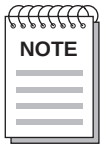


Figure 2-2. Connecting a nominal 48/60 volt Positive Power Source

Connecting a Nominal -48/-60 Volt Negative Power Source

The nominal -48/-60 volt negative power source is connected to a 9C214-2 Power Supply using at least number 10 AWG (5 square millimeters) copper wire to which ring or spade terminals that will accept a number ten screw have been attached. Connect the power source to the connections on the terminal block on the 9C214-2 Power Supply (Figure 2-3) by following the steps below.

1. Interrupt power at the nominal -48/-60 volt power source.
2. Turn off the power supply circuit breaker.
3. Remove the cover protecting the terminal block.
4. Connect the earth ground lead to the earth ground terminal.
5. Connect the -48/-60 volt return lead to the positive terminal.
6. Connect the -48/-60 volt lead to the negative terminal.
7. Replace the cover on the terminal block.
8. Restore power to the -48/-60 volt power source.
9. Turn on the power supply circuit breaker.



If the input polarity detection buzzer sounds after turning on the power supply circuit breaker, the connections are wrong. Turn off the power supply circuit breaker, interrupt power at the nominal -48/-60 volt power source, disconnect the power source and make the necessary changes to the existing connections.

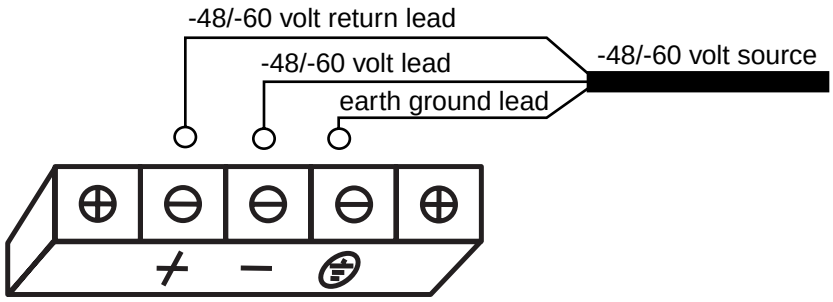
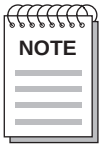


Figure 2-3. Connecting a Nominal -48/-60 Volt Negative Power Source

Powering Up a 9C214-2 Power Supply



Before you power up a 9C214-2 Power Supply, make sure that the Environmental Module and all modules have been properly installed.

1. Turn on the 9C214-2 Power Supply using the circuit breaker at the bottom right of the power supply. (The power supply uses a soft start feature and does a pre-power diagnostic check. Outputs become enabled within 5 seconds of power on.)
2. Check to make sure that
   a. The PWR Status LED is green.
   b. The SMB Status LED is green.

If the LEDs are any color other than green, refer to **LANVIEW LEDs** in Chapter 3.

Chapter 3

9C214-2 Power Supply Operation

The 9C214-2 Power Supply can operate with input voltages ranging from 36 – 72 positive or negative Volts Direct Current (VDC). Each 9C214-2 provides a maximum of 1000 watts of power to the SmartSwitch 9000.

When two or more power supplies are installed, the system uses a current sharing scheme where under all load conditions each supply provides power equally.

Each 9C214-2 Power Supply converts the 36 – 72 VDC to three different DC outputs for use by the power buses within the SmartSwitch 9000. Each of these outputs is described below.

- 57 volts are supplied to the 48 volt DC System Power Bus for use throughout the chassis for each installed module and the Environmental Module system fans.
- 5 volts are supplied to the Diagnostic Power Bus used by the diagnostic controllers and the Environmental Module.
- 3.3 volts are supplied to the INB Termination Power Bus.

Operating Functions

The 9C214-2 Power Supply includes the following functions:

- System Diagnostic Controller
- Temperature Sensor
- Power Supply Cooling
- LANVIEW LEDs
- Load Sharing

Diagnostic Controller

The diagnostic controller is composed of a Z-80 microprocessor and it's supporting logic. The diagnostic controller is designed to monitor the power supply's input and output power parameters as well as the temperature and fan status. In addition, the diagnostic controller adjusts fan speed and controls the LANVIEW diagnostic LEDs. The information gathered by the diagnostic controller is available to the network manager via the LCD on the 9C300-1 Environmental Module, as well as local and remote management. If the diagnostic controller fails, the 9C214-2 Power Supply has been designed to continue to function and supply power to the system.

Internal Temperature Sensor

Each 9C214-2 Power Supply has a built-in temperature sensor for monitoring its own internal temperature. The results of the monitoring are available to the network manager via the LCD on the 9C300-1 Environmental Module, as well as local and remote management.

Power Supply Cooling

Each 9C214-2 Power Supply includes an internal cooling fan. The diagnostic controller monitors the internal temperature of the power supply and increases or decreases the fan speed based on that temperature. If the diagnostic controller fails, fan speed defaults to 100% to ensure protection of the power supply.

LANVIEW LEDs

The LANVIEW LEDs on the back of the 9C214-2 Power Supply can be used as an aid in troubleshooting.

There are three LANVIEW LEDs visible to the user (Figure 3-1):

- PWR Status LED
- SMB Status LED
- Power Supply Level Indicator LED

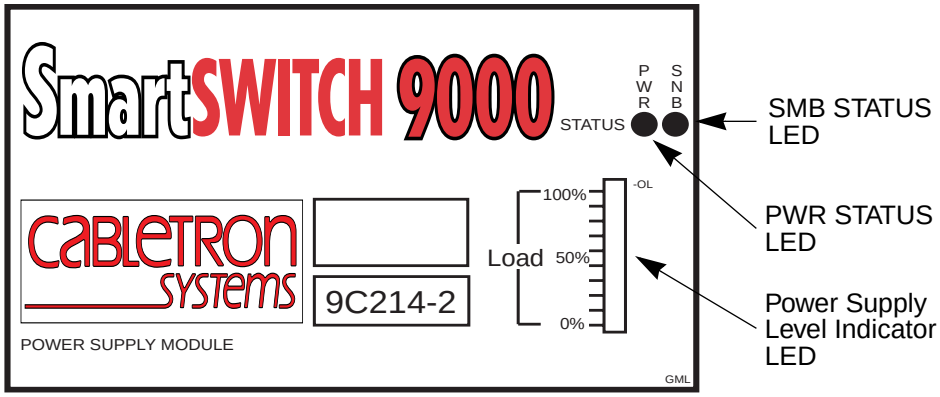


Figure 3-1. 9C214-2 Power Supply LANVIEW LEDs

The PWR Status LED indicates, by color, the status of a power supply's input and outputs. The possible colors, states, and descriptions of the PWR Status LED are listed in Table 3-1.

Table 3-1. PWR Status LED

LED Color	State	Description
Green	Functional	The 57 volt, 5 volt, and 3.3 volt outputs, as well as the input, are within established tolerances.
Yellow	Crippled	Not fully operational due to lack of DC input.
Red	Fault	One of the system power supply outputs, or input is out of regulation.

The SMB Status LED indicates, by color, the status of the diagnostic controller. The possible colors, states, and descriptions of the SMB Status LED are listed in Table 3-2.

Table 3-2. SMB Status LED

LED Color	State	Description
Green	Functional	Fully operational.
Yellow / Green	Booting	Flashes yellow and green while booting.
Yellow	Testing	Power up testing being performed.
Yellow (Flashing)	Crippled	Limited functionality of the diagnostic controller or fan failure.
Red	Reset	Normal power-up reset.
Red (Flashing)	Failed	Fatal error has occurred.
Off	Power off	Module powered off.

The Power Supply Level Indicator LED indicates, by segment number, the percentage of the power supply's capacity being used. The possible states and descriptions of the Power Supply Level Indicator LED are listed in Table 3-3.

Table 3-3. Power Supply Level Indicator LED

Segment Number(s)	LED Color	State	Description
1 - 5	Green	0–49% of power load being used.	No action necessary.
6 - 9	Green	50-89% of power load being used. No parallel power supply operational.	No action necessary.
6 - 9	Green / Yellow	50-89% of power load being used. Parallel supply(ies) installed; however, yellow indicates loss of redundancy.	Add an additional power supply if redundancy is desired.
10	Yellow	Greater than 90% of power supply being used.	Add an additional power supply for redundancy.
11	Red	Overload condition exists.	Add an additional power supply or reduce number of modules in the chassis.

Load Sharing

Each 9C214-2 Power Supply uses a current sharing design. This design allows multiple power supplies to equally (within ± 5%) share the output load. For example, if two power supplies are used, each power supply provides 50% ± 5% of the output load. This feature increases the life of each power supply.

Chapter 4

Specifications

Safety

It is the responsibility of the person who sells the system to which the modules will be a part to ensure that the total system meets allowed limits of conducted and radiated emissions.

The 9C214-2 Power Supply, when properly installed on the SmartSwitch 9000 Chassis, complies with the following specifications and standards:

Safety Requirements of:

- UL 1950
- CSA C22.2 No. 950
- EN 60950
- IEC 950
- TR-NWT-000063

EMI Requirements of:

- FCC Part 15 Class A
- EN 55022 Class A
- VCCI Class I
- GR-1089-CORE

EMC requirements of:

- EN 50082-1
- IEC 801-2 ESD
- IEC 801-3 Radiated susceptibility
- IEC 801-4 EFT
- GR-1089-CORE

Service

The 9C214-2 Power Supply is designed with the following service capability:

MTBF (MIL-STD-217):	>200,000 hours projected
MTTR:	<.50 hour

Bellcore Standards

The 9C214-2 Power Supply, when properly installed on the SmartSwitch 9000 Chassis, complies with the following standards:

TR-NWT-000063Network Equipment Building System (NEBS) Generic Equipment Requirements

GR-1089-COREEMC and Electrical Safety Generic criteria for Network Telecommunications Equipment.

Physical

Dimensions

60.96 H x 19.05 W x 13.97 D centimeters
(24 H x 7.5 W x 5.5 D inches)

Weight

Unit:	5.8 kilograms (13 lbs.)
Shipping:	7.2 kilograms (16 lbs.)

Environmental

The 9C214-2 DC Power Supply has been tested, and found to be in compliance with Bellcore TR-NWT-000063.

Operating Temperature:	5 – 40° C, 41–104° F
Operating Humidity:	5% to 95% non-condensing
Cooling:	2.15 cubic meters of air per minute drawn through the chassis 76 cubic feet of air per minute drawn through the chassis

DC Input

Each 9C214-2 Power Supply operates with the following voltage and current.

Voltage

36–72 VDC

Current

30A DC Maximum

Fusing

The DC input to the 9C214-2 Power Supply has a built in 30 amp circuit breaker.

DC Input Connection

The DC input connector is a three connector terminal block. Connections are made from the DC power source to this block using at least number 10 AWG (5 square millimeters) copper wire to which ring or spade terminals that will accept a number ten screw have been attached.

Output Power

Each 9C214-2 Power Supply is capable of generating the following output voltages:

57 volts @ 17A
3.3 volts @ 16A
5.1 volts @ 17A